REMARKS/ARGUMENTS

I. Introduction:

Applicant's undersigned attorney called Examiner Tang on July 11, 2006 and requested an Interview. Examiner Tang responded that she would not grant an interview and that applicant should respond in writing. **An Interview is requested after the Examiner has had an opportunity to review applicant's response.**

II. Claim Rejections – 35 U.S.C. §103:

Claims 1, 2, 4, 6-9, 11, 14, 15, 18-20, 22-25, 27-29, 31 and 37-41 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,757,255 (Aoki et al.) in view of U.S. Patent No. 6,657,987 (Kumar et al.) in further view of U.S. Patent Application Publication 2002/0194343 (Shenoi et al.). Claims 33-36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. in view of Kumar et al., in further view of Shenoi et al. and "Network Traffic Characterization Using Token Bucket Model" (Tang et al.). For the reasons set forth below, applicant respectfully requests reconsideration of these rejections.

In the final Office Action of June 20, 2006, the Examiner cites a new reference, Shenoi et al. As discussed in the previous responses and summarized below, the primary references do not show or suggest the claimed invention. The new reference does not overcome the deficiencies of the primary references and does not show or suggest the limitations included in the amended claims as filed in Amendment D.

A. Aoki et al. do not disclose calculating a burst parameter based on traffic data collected at a queue:

Aoki et al. disclose an apparatus for measuring communication performance. The apparatus measures the performance in the TCP communications on a

communications route of a network. An average value of round trip times is obtained based on a small number of measurement-oriented packets at an interval of fixed time, a maximum segment size obtained based on a packet size of the packets transmitted and received, and a maximum congestion window size estimated from a time change in the round trip time, are used as performance indexes. Aoki et al. do not show or suggest calculating a burst parameter based on collected traffic data.

In contrast to applicant's invention, Aoki et al. obtain performance indexes of a round trip based on direct measurement of packets transmitted and received. Direct measurement is cumbersome and provides only information about current conditions. It does not predict how the system will perform under different traffic conditions, or how the system will perform with a different allocation of resources. Being able to analyze network performance under hypothetical conditions is useful, for example when a customer and internet service provider agree to the customer sending increased voice and video traffic. Such traffic is burstier than data traffic. Applicant's invention, as set forth in the claims, can be used to estimate the effect of an increase in bursty traffic on delay and obtain an estimate of periodic worst-case delay in a way that is scalable to large networks, and does not disrupt normal network performance.

As noted by the Examiner, Aoki et al. also do not disclose calculating a burst-rate traffic profile or worst-case delay.

B. Kumar et al. do not disclose calculating a burst-rate traffic profile or a periodic worst-case delay for a traffic profile:

The Kumar et al. patent is directed to scheduling in a Time Division Duplex (TDD) wireless communication network. A method disclosed in Kumar et al. includes scheduling of periodic voice slots for a link between a master and slave transmission on a wireless channel. Fig. 1 illustrates an envelope of incoming traffic to a wireless connection. The arrival and service curves are shown. A burst of maximum size arrives at a peak rate, after which, until the buffer is emptied, the arrivals are at an average rate.

In rejecting claim 1, the examiner refers to equation 1 of Kumar et al. This equation calculates a token rate based on a service rate, number of packets served in a wireless session, and a maximum packet length (see, for example, col. 5 and claim 1). Fig. 2 is a graph illustrating the basis on which the equation is derived. The graph shows the relationship between a polling interval and service quantum, service rate, and maximum bandwidth. Equation 1 is not used to calculate a burst-rate traffic profile. Instead, it is used to calculate a token rate.

The Examiner next refers to col. 6, lines 40-67 of the Kumar et al. patent. This section of the patent discusses a method for modeling a guaranteed connection as a periodic task with deadlines. A periodic task is defined as a sequence of requests for "c" units of service time. This allows a connection to be serviced before its deadline. This model is used to ensure that that maximum time away from a connection is less than 2 times a period "p" of the periodic task and that a bandwidth c/p worth of service is given to the connection every p units of time. Kumar et al. are concerned with scheduling a guaranteed connection rather than calculating a burst-rate (or other) traffic profile based on collected data. The periodic tasks and required service time are known and not based on data collected over a time interval. Periodic tasks are scheduled depending upon a polling interval which is derived based on defined QoS requirements as set forth in col. 2. The only parameter used by the scheduler is the polling interval.

Columns 7 and 8 of Kumar et al. describe calculation of the period of composite task from the link layer parameters of the forward and reverse link. The equation at line 46 of col. 7, for example, is used to ensure that maximum tolerable delay is not crossed by either connection. Thus, rather than calculating a periodic worst-cast delay, Kumar et al. use a predefined maximum tolerable delay to calculate a polling interval that satisfies latency requirements. There is no teaching in Kumar et al. of calculating a periodic worst-case delay for a given traffic profile.

C. Shenoi et al. do not disclose collecting traffic data comprising arrival time and size of packets:

The Shenoi et al. patent application is directed to measurement of time-delay, time-delay variation, and cell transfer rate in ATM networks. ATM is a communications standard based on cell relay techniques. As noted by Shenoi et al., the underlying premise of ATM is that a data stream is segmented into fixed size cells. This differs from TCP/IP, in which messages are divided into packets. Shenoi et al. simply describe sending cells that contain time-stamps. The time-stamp information cell is generated at a first location and then transmitted to a second location. Shenoi et al. do not show or suggest collecting traffic data comprising arrival time of packets or size of packets, as set forth in the claims.

D. Claims 1, 2, 4, 6-9, 11, 14, 15, 18-20, 22-25, 27-29, 31 and 37-41 are patentable over Aoki et al., Kumar et al., and Shenoi et al.:

For the reasons discussed above, claim 1 is submitted as patentable over Aoki et al., Kumar et al., and Shenoi et al.

Claims 2-4, 6-8, and 32-41, depending either directly or indirectly therefrom, are submitted as patentable for the same reasons as claim 1.

Claim 6 is further submitted as patentable over the references cited which do not show or suggest calculating a periodic worst-case delay by dividing a burst parameter by an allocated bandwidth associated with a queue. In rejecting claim 6, the Examiner refers to col. 17, lines 4-40, 54-68 and col. 18, lines 1-20 of the Aoki et al. patent. Col. 17 describes a method for calculating available bandwidth. For example, lines 31-35 describe when a transfer speed P of a measurement oriented packet exceeds an upper limit of available bandwidth of a route, the available bandwidth can be presumed to be less than the transfer speed (E/δ). Col. 18 discusses judging whether or not the speed of the measurement-oriented packet exceeds available bandwidth of a route by checking whether or not the round trip times of the measurement-oriented packet has a certain relationship to the round trip times of other measurement-oriented packets. There is no discussion in Aoki et al. of calculating a worst-case delay by dividing a burst parameter

by an allocated bandwidth associated with a queue. As noted above, neither Aoki et al. nor Kumar et al. address calculating a worst-case delay for a burst-rate traffic profile. Furthermore, Aoki et al. are concerned with available bandwidth of a route rather than bandwidth associated with a specific queue.

Claim 9 is directed to a method of estimating worst-case queuing delay along a path. The method includes collecting a rate parameter and a burst parameter. As previously discussed, neither Aoki et al. nor Kumar et al. show or suggest calculating a periodic worst-case delay associated with the rate and burst parameters. Moreover, these references do not teach adding up a periodic worst-case delay associated with routers along a path, as required by claim 9.

Accordingly, claim 9 is submitted as nonobvious over the prior art of record.

Claim 11 specifies calculating a burst parameter and a burst-rate traffic profile, claims 14 and 27 require code that causes a processor to calculate a burst parameter and code that causes the processor to calculate a burst-rate traffic profile, and claim 23 specifies means for calculating a burst parameter for the collected traffic and means for calculating a burst-rate traffic profile. Claims 12, 14, 23, and 27 are submitted as patentable for at least the reasons discussed above with respect to claim 1. Claim 15, depending from claim 14, claim 24, depending from claim 23, and claim 27, depending from claim 26, are submitted as patentable for the same reasons as claims 14, 23, and 26.

Claims 20 and 29 specify code that causes the processor to receive burst and rate traffic parameters. Claim 25 requires means for periodically collecting rate and burst traffic parameters. Claim 31 specifies that the periodic worst-case delay is based on a burst parameter and a rate parameter. Claims 11, 26, 30, and 32 are submitted as patentable for the reasons previously discussed with respect to claim 9. Claim 22, depending from claim 20, is submitted as patentable for the same reasons as claim 20.

E. Claims 33-36 are patentable over Aoki et al., Kumar et al., Shenoi et al., and Tang:

Applicant respectfully submits that Tang et al. do not remedy the deficiencies discussed above for the primary references.

III. Conclusion:

For the foregoing reasons, applicant believes that all of the pending claims are in condition for allowance and should be passed to issue. If the Examiner feels that a telephone conference would in any way expedite the prosecution of the application, please do not hesitate to call the undersigned at (408) 399-5608.

Respectfully submitted,

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